UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/668,834	09/23/2003	Chul Gyu Song	03-607	4990

34704 7590 03/09/2006

BACHMAN & LAPOINTE, P.C.
900 CHAPEL STREET
SUITE 1201
NEW HAVEN, CT 06510

EXAMINER	
SUNDARARAMAN, VIKRAM P	
ART UNIT	**PAPER NUMBER**
3736	

DATE MAILED: 03/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/668,834	SONG ET AL.	
	Examiner	Art Unit	
	Vikram P. Sundararaman	3736	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *8 and 10-13* is/are allowed.

6)☒ Claim(s) *1-3 and 5-7* is/are rejected.

7)☒ Claim(s) *4-7,9 and 14-19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *Copy of NPL References Cited*.

DETAILED ACTION

Request for Information

Examiner requests copies of the following two non-patent literature journal articles/conference proceedings that are authored/co-authored by the applicant(s):

Kim et al., "Human Arm Motion detection System for Robot teleoperation Using Electrical Bio-Impedance Method," 11th Inter Conf Elect Bio-Imp, Oslo, Norway, Vol 11, pp 615-618, 2001; and

Kim et al., "Optimal Electrode Configuration for Detection of Arm Movement using Bio-Impedance," 2nd Euro Med & Biol Eng Conf, Vienna, Austria, 2002

Priority

1. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 10/668834, filed on September 23, 2003.

Claim Rejections - 35 USC § 101

2. **Claims 1, 6,7, and 14** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claim 1 recites the limitation "electrodes for measuring voltage on a certain region of a living body" on lines 7-8 of the claim. Claim 6 recites the limitation "wherein the voltage detecting electrodes are positioned at: two points on each of three lines that equally quadrisect an interval

between an ankle and a knee joint; four points on each of two lines that equally trisect an interval between the knee joint and a hip joint; and a certain point between the ankle an toe" on lines 1-7 of the claim. Claim 7 recites, "wherein the voltage detecting electrodes are positioned at: two points on each of three lines that equally quadrisect an interval between a wrist and an elbow joint; four points on each of two lines that equally trisect an interval between the elbow joint and a shoulder joint; and a certain point between the wrist and fingers" on lines 1-7 of the claim. Claim 14 additionally recites, "from a point of a living body to another" on line 8 of the claim; "electrodes which positioned in a certain region between a hip joint and a knee joint" on lines 10-11 of the claim; "electrodes which positioned in a certain region between a knee joint and the ankle joint" "on lines 18-19 of the claim; and "electrodes which positioned in a certain region between the knee joint and the toes" on lines 22-23 of the claim. In each instance, the human body is non-statutory subject matter and cannot positively be claimed. To overcome this rejection, for example, lines 10-11 of claim 14 should be replaced with "electrodes which are adapted to be able to be positioned between a hip joint and a knew joint."

Claim Objections

3. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: The specification teaches "a weak current of 50 kHz" [Page 8, Lines 8-9]. The object could be overcome by changing **Claims 4** and **Claim 9** to

read, "wherein the weak current has a frequency of 50 kHz" in lines 1-2 of the respective claims.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

5. **Claims 1-3 and 5-7** are rejected under 35 U.S.C. 102(a) as being anticipated by Liedtke, US 6,631,292 B1, hereinafter referred to as Liedtke. Liedtke does not teach using bio-impedance to specifically measure joint motion. However, Liedtke does teach a bio-impedance analyzer which has the same structural features as the disclosed invention which would be capable of being used in the manner claimed to analyze joint-motions using bio-impedance.

6. As to **Claims 1 and 3**, Liedtke discloses a bio-electrical impedance analyzer that teaches "the constant current system is a transformer coupled, open loop DC servo system that includes an oscillator, 14, an amplifier, 16, a modulator 18, an input coupling transformer, 20, a measuring circuit 24, a buffer amplifier 26, a rectifier, 28, a DC reference source, 30, and a comparator 32." [Column 4, Lines 22-27] (a constant current source comprised of an oscillation frequency circuit and a voltage-to-current

conversion circuit for generating a weak current) Liedtke also teaches "the input coupling transformer, 20, supplies a current to the subject through conventionally placed electrodes, 54, in the subject interface, 22, through two buffer resistors. The electrodes, 54, could be either standard electrodes or two electrodes from a tetrapolar lead, with the additional two electrodes detecting a voltage drop caused by the subject impedance." [Column 5, Lines 19-25] (current stimulus electrodes for allowing the weak current to flow from a point of a living body to another; at least two voltage detection electrodes from measuring voltage) Liedtke further teaches "the detection transformer, 34, receives the unbalanced input from the subject at its primary and provides a balanced output at its secondary," [Column 7, Lines 19-21] (a demodulator) "the voltage from the secondary of the detection transformer, 34, is amplified through an RF amplifier, 36." {Column 7, Lines 34-25] (an isolated amplifier) and "the inverting inputs of the op amps, 70, receive feedback through resistors, and the inverting inputs are coupled through another resistor in parallel with a capacitor, which controls the common mode gain." [Column 7, lines 41-44] (a signal gain and offset controller for controlling gain and offset signals)

7. As to **Claim 2**, Liedtke further teaches "the phase detectors, 74, 76, each include circuitry for demodulation and low-pass filtering" [Column 8, Lines 24-25] (further comprising a low-pass filter)

8. **Claims 5-7** are rejected as the electrodes taught by Liedtke are capable of being positioned as described in the limitation.

Allowable Subject Matter

9. **Claims 8 and 10-13** are allowable for the following reasons:

The prior art does not describe the positioning of electrodes in the manner disclosed by the applicant and measuring bio-impedance based on the selection of electrodes having a highest-variation. Whereas the positioning of electrodes is given a broad range of possibilities as per the limitation in Claim 5, the applicant further limits the range of possibilities in Claims 6 and 7 to include specifically detecting electrodes on two points on each of three lines that equally quadrisect an interval between an ankle and a knee joint; four points on each of two lines that trisect an interval between the knee joint and a hip joint; and a certain point between the ankle and toes and detecting electrodes on two points on each of three lines that quadrisect an interval between a wrist and an elbow joint; four points on each of two lines that trisect the elbow joint and a shoulder joint; and a certain point between the wrist and fingers, respectively. The optimization of selected electrodes based on variation between electrode positions is the novelty of the invention.

10. **Claim 9** would be allowable if the applicant overcomes the objection to the claim as disclosed previously in Item 3 of this action

11. **Claims 14-19** would be allowable if the applicant overcomes the objection to **Claim 14** as disclosed previously in Item 2 of this action. The following is a statement of reasons for the indication of allowable subject matter: The limitations set forth on Claim 14 are novel over the prior since the invention as claimed includes a control unit for using bioimpedance measurements from electrodes to calculate the digital signals output from the A/D converter into angular variations of the joints.

12. As allowable subject matter has been indicated, applicant's reply must either comply with all formal requirements or specifically traverse each requirement not complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Kim et al., "Evaluation of a Bio-impedance Method for measuring Human Arm Movement," Yonsei Medical Journal, Vol 43(5), pp 637-643;

Kim et al., "Human Arm Motion detection System for Robot teleoperation Using Electrical Bio-Impedance Method," 11th Inter Conf Elect Bio-Imp, Oslo, Norway, Vol 11, pp 615-618, 2001; and

Kim et al., "Optimal Electrode Configuration for Detection of Arm Movement using Bio-Impedance," 2nd Euro Med & Biol Eng Conf, Vienna, Austria, 2002

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vikram P. Sundararaman whose telephone number is 571-272-3351. The examiner can normally be reached on M-F, 730am-4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Max Hindenburg can be reached on 571-272-4726. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

VPS